INTERNATIONAL STANDARD

ISO 446

Third edition
2004-03-15

Micrographics — ISO character and ISO test chart No. 1 — Description and use

Micrographie — Caractére ISO et mire ISO N° 1 — Description et utliisation

Reference number
ISO 446:2004(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 446 was prepared by Technical Committee ISO/TC 171, *Document management applications*, Subcommittee SC 1, *Quality*.

This third edition cancels and replaces the second edition (ISO 446:1991), which has been technically revised.

Introduction

Most processes produce images of lower quality; among others diffusion transfer, if it still exists, is capable of enhancing quality. This degradation may go so far as to make the information illegible. Poor legibility may also cause visual fatigue after prolonged viewing.

The legibility of an image can be assessed by measuring the limit of resolution, i.e. the ability to distinguish lines in different directions. However, the limit of resolution corresponds to a quality level insufficient to permit easy reading, and to prolong it without visual fatigue.

A criterion which better simulates actual working conditions was sought. The ISO character, which is a conventional character similar to typefaces used in the printing industry, the outline and details of which should be distinguished without difficulty, meets these requirements.

The main practical applications of the ISO character are based on the following experimental properties.

a) If a particular reproduction process gives an identifiable image from a group of ISO characters of a certain height, it can be assumed that the same process will produce, from a printed text of comparable typeface size, a satisfactory image and, in particular, one that is sharp enough to be read, without undue visual fatigue for the viewer.

b) In general, the identification of the same limiting group of ISO characters by different observers gives substantially identical results.

Care should be taken when referencing this International Standard in other standards. Some countries do not use this standard or use alternative standards (such as ISO 3334:1989, *Micrographics — ISO resolution test chart No. 2 — Description and use*).

Micrographics — ISO character and ISO test chart No. 1 — Description and use

1 Scope

This International Standard specifies the characteristics of the black and white ISO character and of the ISO test chart No. 1, as well as their use.

It applies to the quality control of the microimages produced with a given micrographic system and the assessment of the potential legibility of the documents recorded using that system.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3:1973, *Preferred numbers — Series of preferred numbers*

ISO 5-2:2001, *Photography — Density measurements — Part 2: Geometric conditions for transmission density*

ISO 5-3:1995, *Photography — Density measurements — Part 3: Spectral conditions*

ISO 5-4:1995, *Photography — Density measurements — Part 4: Geometric conditions for reflection density*

ISO 2471:1998, *Paper and board — Determination of opacity (paper backing) — Diffuse reflectance method*

ISO 6196-1:1993, *Micrographics — Vocabulary — Part 1: General terms*

180 6196-2:1993, *Micrographics — Vocabulary — Part 2: Image positions and methods of recording*

ISO 6196-3:1997, *Micrographics — Vocabulary — Part 3: Film processing*

ISO 6196-4:1998, *Micrographics — Vocabulary — Part 4: Materials and packaging*

ISO 6196-5:1987, *Micrographics — Vocabulary — Part 5: Quality of images, legibility, inspection*

ISO 6196-6:1992, *Micrographics — Vocabulary — Part 6: Equipment*

ISO 6200:1999, *Micrographics — First generation silver-gelatin microforms of source documents — Density specifications and method of measurement*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6196 apply.

4 Description and use of the ISO character

4.1 Description

The ISO character is a conventional character, similar to printing typefaces, the shape and size of which is specified below.

It consists of a regular octagon, of a given height c, with two internal parallel lines, the width of lines and spaces being $c/7$ (see Figure 1). The tolerances of c are specified in 5.2.2.

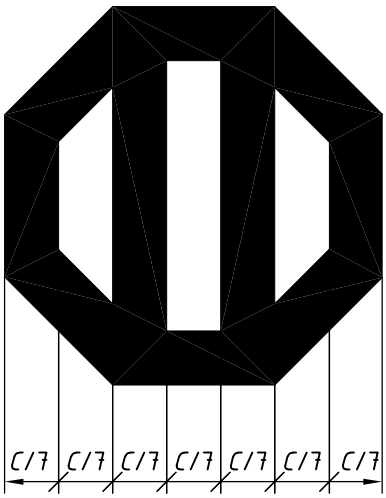


Figure 1 — Enlarged drawing of the ISO conventional character for legibility test

The internal lines may be oriented in four different ways: vertically, horizontally, 45º to the right, and 45º to the left.

This orientation is defined by one of the following terms:

Vertical 

Horizontal 

Right-inclined 

Left-inclined 

4.2 Use

The ISO character may be used in micrographics for making black and white or colour test charts for the quality control of microform production equipment, or microtest charts for use with viewing and printing equipment. It may also be used for controlling the quality of images produced with other techniques (photography, reprography, etc.).

5 Production of ISO test chart No. 1

5.1 Base

The test chart shall be made on either an opaque or a transparent base.

5.1.1 Opaque base

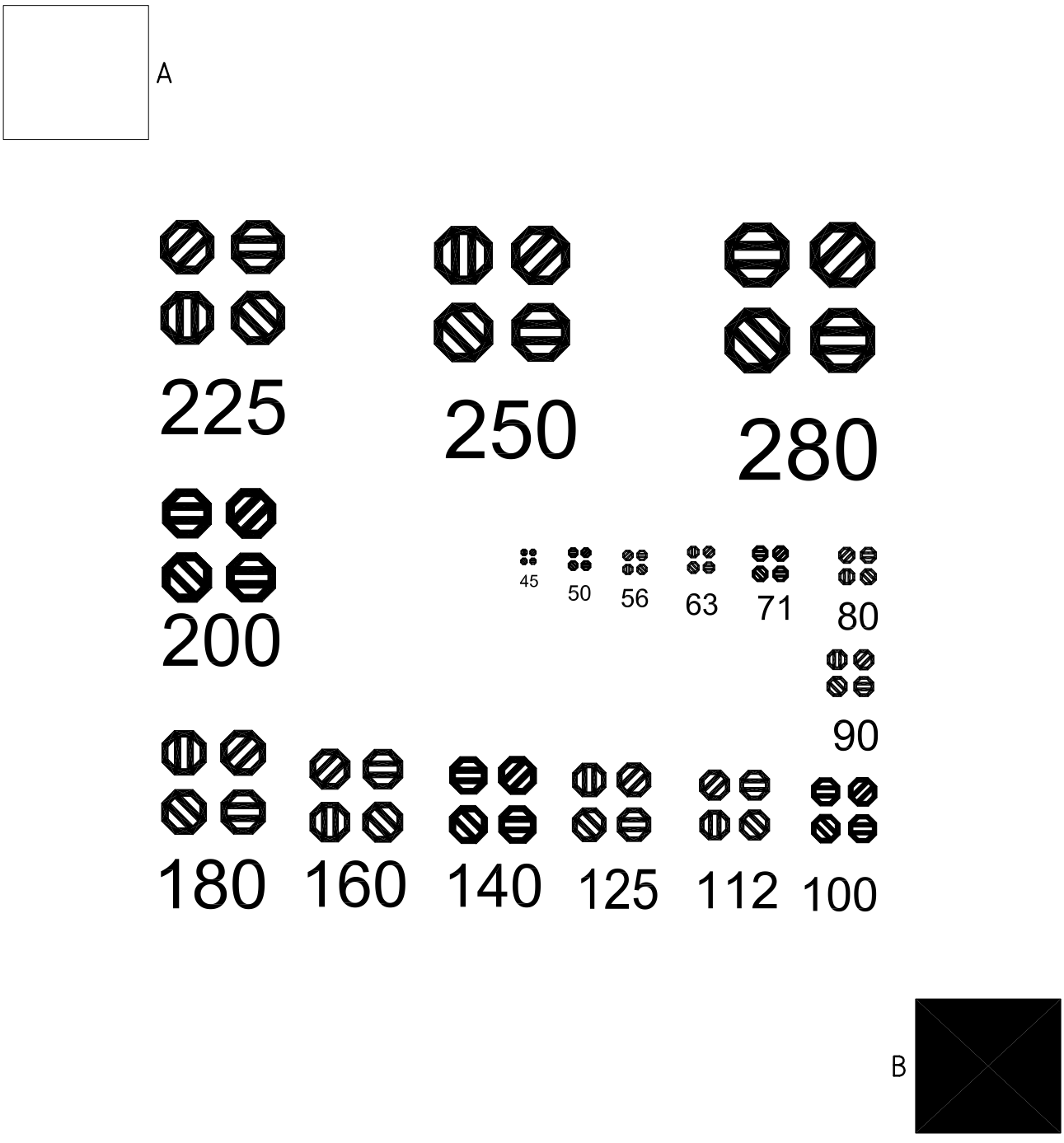
The test chart shall be made on a white opaque base (preferably glossy). Its visual diffuse reflection density, measured in accordance with ISO 5-3 and ISO 5-4, shall be not more than 0,08. Its opacity, measured as specified in ISO 2471, shall be greater than 85 %. This test chart shall be positive-appearing.

5.1.2 Transparent base

The test chart shall be made on a non-coloured transparent base having a maximum visual diffuse transmission density, base + fog, of 0,08 measured in accordance with ISO 5-2 and ISO 5-3. This test chart may be positive-appearing or negative-appearing.

5.2 Test chart lay-out

ISO test chart No. 1 consists of groups of ISO characters arranged as shown in Figure 2.



NOTE The numbers shown in this figure are the values given in 5.2.2 divided by 10 µm.

This illustration is not to be used for testing.

Figure 2 — Sample layout of ISO test chart No. 1

5.2.1 Group of characters

Each group comprises four ISO characters of the same size, each of different orientation (see 4.1).

The characters shall be arranged in a square pattern as shown in Figure 3 and shall be oriented randomly.

The minimum space between two characters, horizontally and vertically, shall be $2c/7$.

The minimum space between two groups of characters shall be $2c/7$ of the smallest character of the two groups.

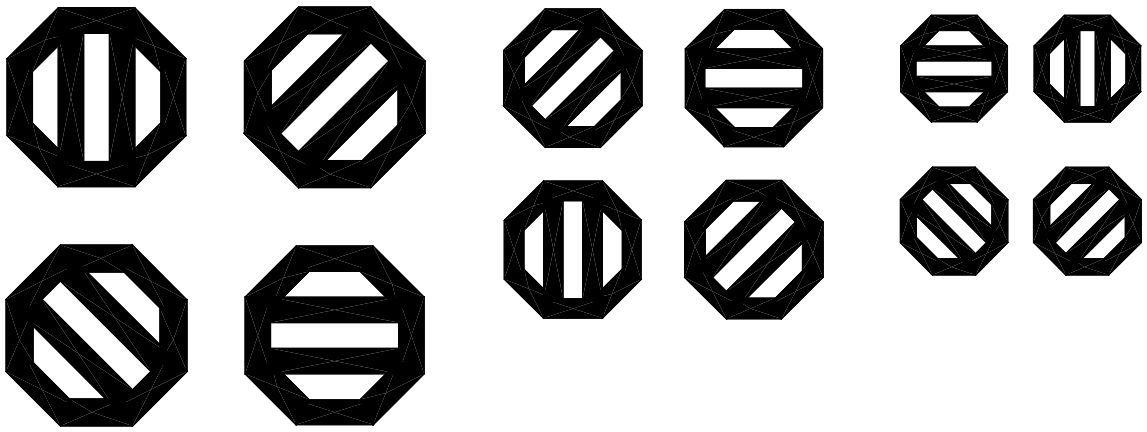


Figure 3 — Examples of groups of ISO characters

5.2.2 Sizes of characters

Dimension c, in micrometres, of the four characters of each group shall be established by reference to the R 20 series of preferred numbers specified in ISO 3:

450	500	560	630	710	800	900
1000	1120	1250	1400	1600	1800	2000
2250	2500	2800				

The white and black lines within each group of four characters shall have the same widths, with a tolerance of $\pm$ 7 µm, measured on each character segment (see Figure 4). However, the maximum tolerance on these dimensions ($c/7$) shall be $\pm$ 2 %.

5.2.3 Contrast

The minimum visual diffuse density difference between the base and the characters shall be 3,0 for test charts on a film base and 1,6 for test charts on paper.

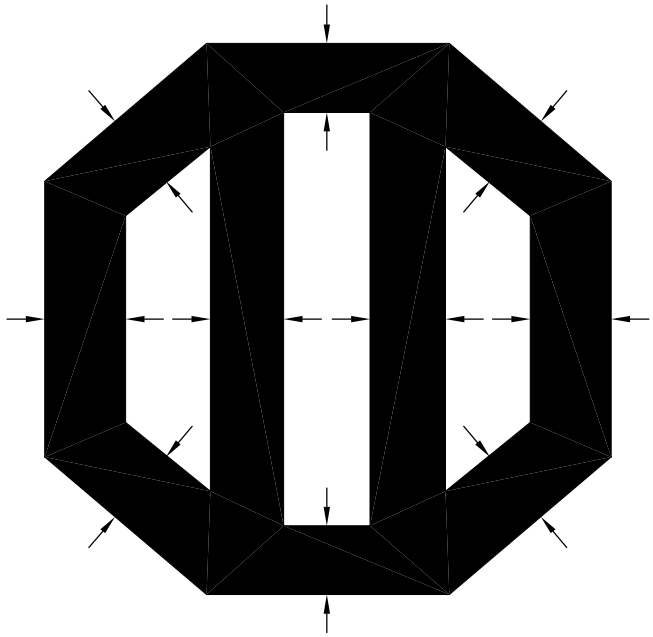


Figure 4 — Measurement of line width

The visual diffuse density of the white lines in the ISO character should be not more than 0,02 greater than the visual diffuse density of the paper.

5.2.4 Identification of the groups of characters

Each group is identified by a number, placed at the bottom of the group, corresponding to the size of the characters it contains. For example, number 45 corresponds to a group composed of characters with dimension c of 0,45 mm in size.

The numbers shall be legible to the naked eye. The size of the numbers corresponding to characters smaller than 125 shall be greater than those of the corresponding characters.

5.3 Density-measuring areas

To check that the test chart meets the requirements of 5.2.3, it shall include two areas, a clear one for measuring the background density of the test chart, and a dark one, the density of which shall be considered to be equal to that of the characters. Each area shall be at least 10 mm $\times$ 10 mm. These areas are identified as A and B in Figure 2.

NOTE These areas are not used for measuring the densities of the microimages (see 6.2).

5.4 Identification

The words "ISO test chart No. 1", a reference to this International Standard or to any equivalent national standards and the certifying agent[1)] , or source of issue shall appear on the test chart.

1) Test charts certified to conform to this International Standard can be obtained from AFNOR, 11, avenue Francis-de-Pressensé, F-93571 Saint-Denis La Plaine Cedex, France. Tel: +33 (0)1 41 62 80 00. Fax: +33 (0)1 49 17 90 00. Web site: http://www.afnor.fr

5.5 Certification of ISO No. 1 test charts

Only test charts complying in every respect with this International Standard and verified by a qualified laboratory can be designated as ISO No. 1 test charts.

6 Procedure for using ISO test chart No. 1

6.1 Method

Position ISO test charts within the microfilming area so as to test the whole field of view. As a minimum, this shall be in the centre and the four corners. Make test exposures using the same film and processing conditions as will be used in production.

6.2 Density of the film

Measure the background visual diffuse transmission density of the microimages of the test chart in accordance with ISO 6200. When positive-appearing test charts are used, this density shall be 1,60 ± 0,10.

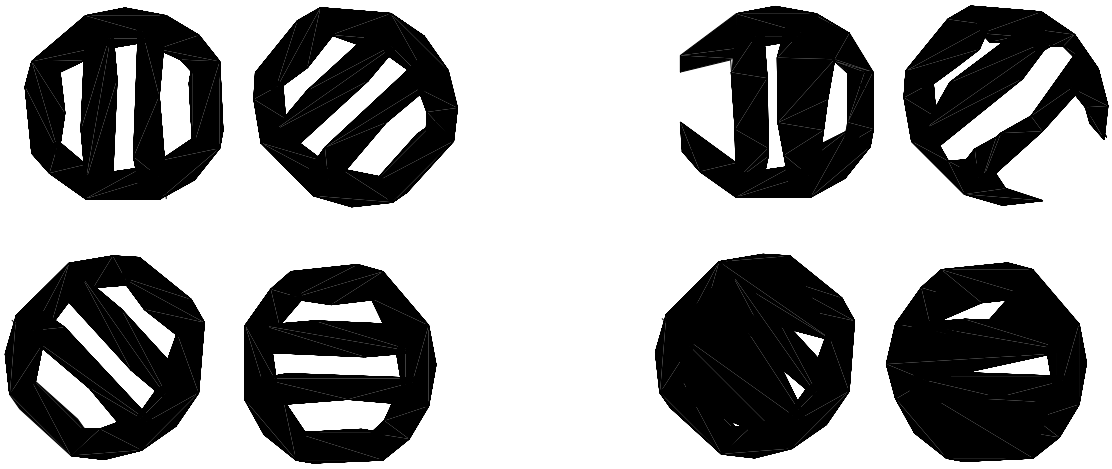
6.3 Legibility control

Examine the microimages of the ISO test chart No. 1 with a microscope of magnification × 30 to × 50, fitted with a lens having a numerical aperture of at least 0,1.

A group of ISO characters of a given size considered in any area of the microimage shall be regarded as "read" if, within each character, all black and white lines are discernible and without discontinuity.

Figure 5 gives examples of characters "read" and "nonread".

The minimum sizes of the characters which are "read" vary in relation to the reduction ratios used.



READ **NONREAD**

Figure 5 — Examples of characters "read" and "nonread"

ICS 37.080

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